FIG. 1

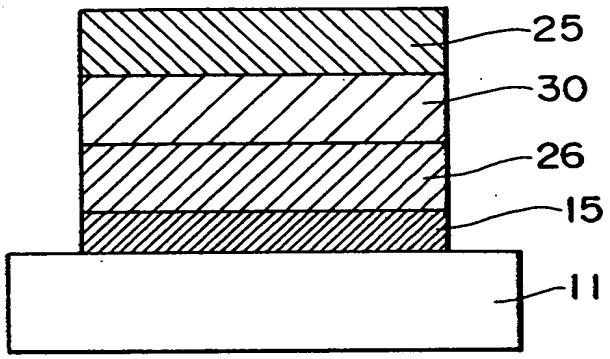
25
30
26
15
11

FIG. 2

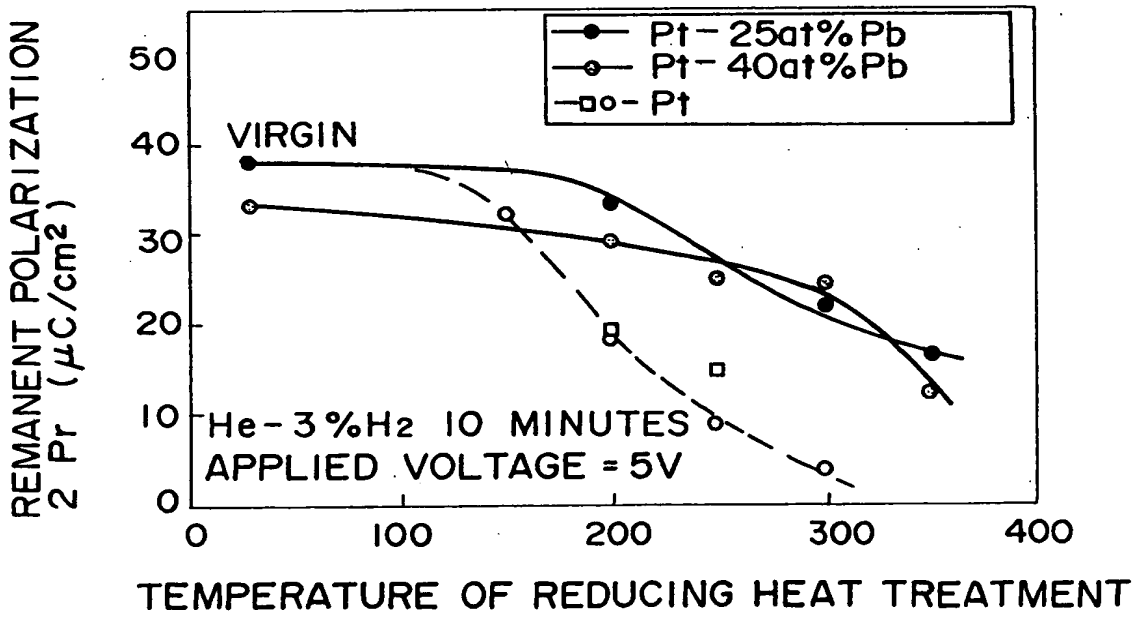
Pt-25at%Pb
Pt-40at%Pb
Pt
VIRGIN
He-3%H2 10 MINUTES
APPLIED VOLTAGE = 5V
REMANENT POLARIZATION
2 Pr (μC/cm²)
0
10
20
30
40
50
0
100
200
300
400
TEMPERATURE OF REDUCING HEAT TREATMENT

FIG. 3(a)

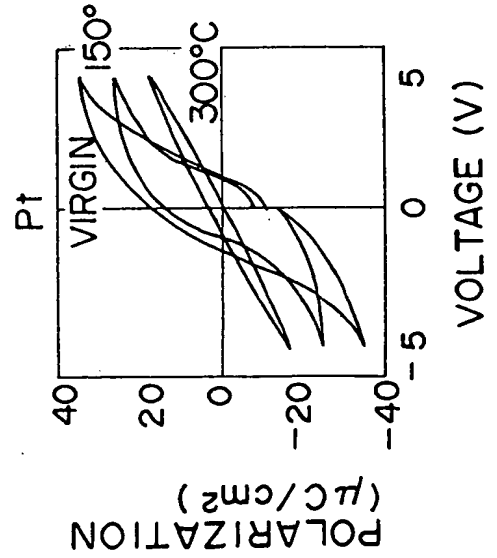

FIG. 3(b)

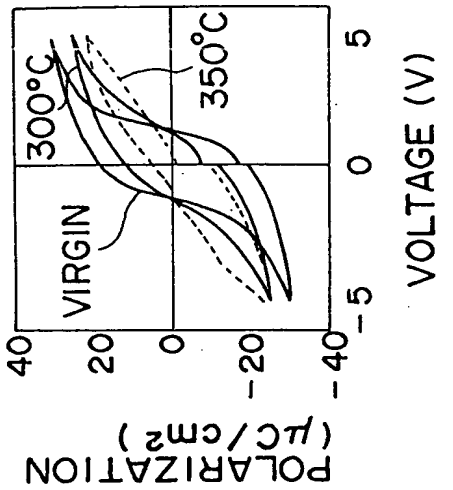

FIG. 3(c)

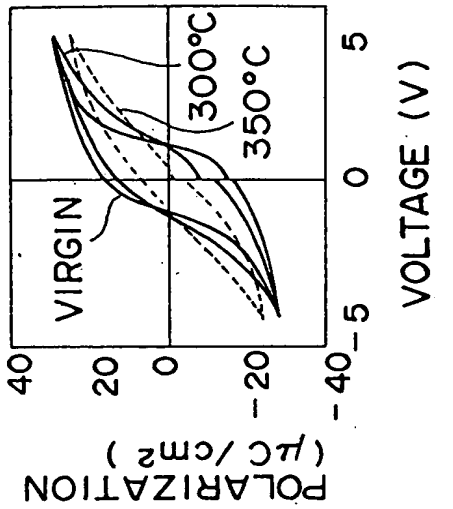

FIG. 4

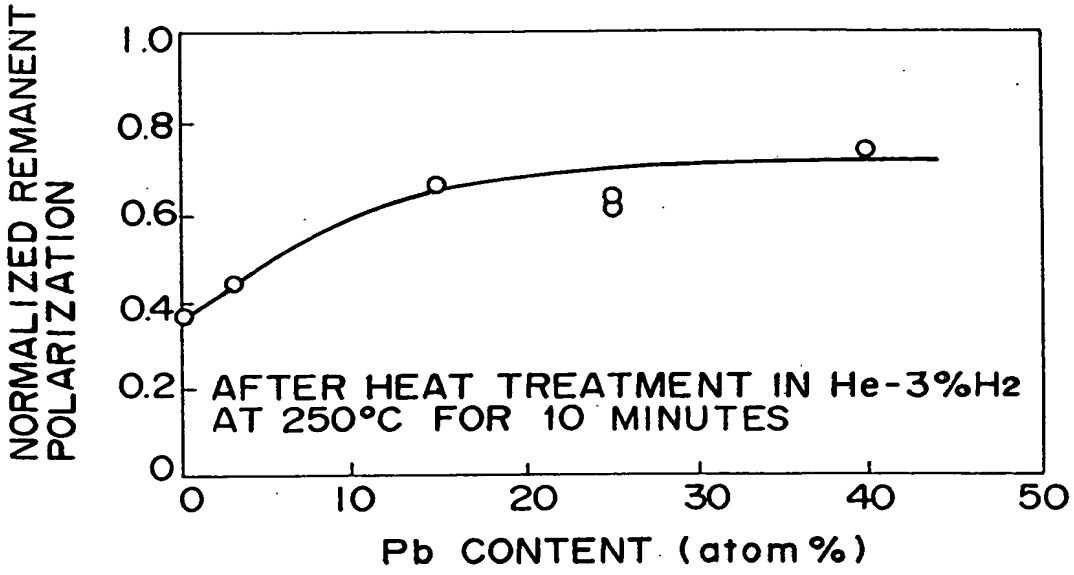
NORMALIZED REMANENT POLARIZATION
1.0
0.8
0.6
0.4
0.2
0
8
AFTER HEAT TREATMENT IN He-3%H2
AT 250°C FOR 10 MINUTES
0
10
20
30
40
50
Pb CONTENT (atom %)

FIG. 5

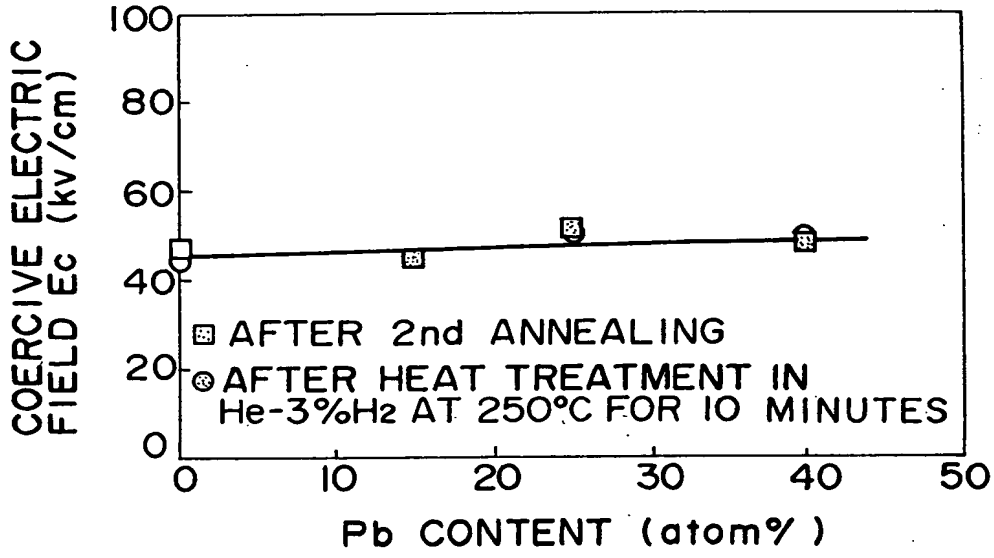
COERCIVE ELECTRIC FIELD Ec (kV/cm)
100
80
60
40
20
0
AFTER 2nd ANNEALING
AFTER HEAT TREATMENT IN
He-3%H2 AT 250°C FOR 10 MINUTES
0
10
20
30
40
50
Pb CONTENT (atom%)

FIG. 6

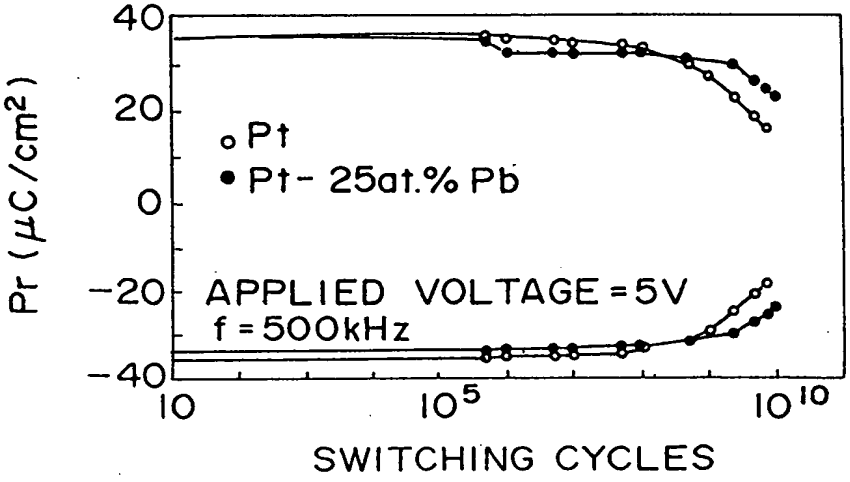

FIG. 7(a)

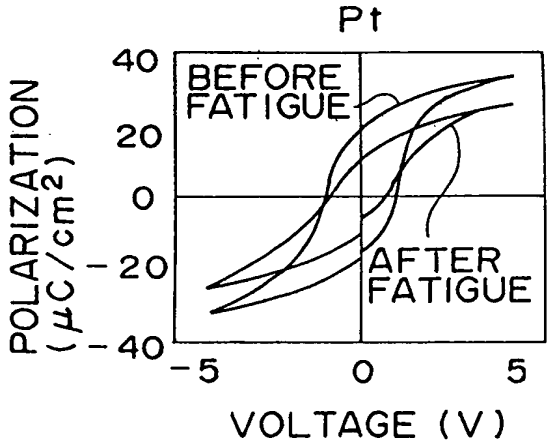

FIG. 7(b)

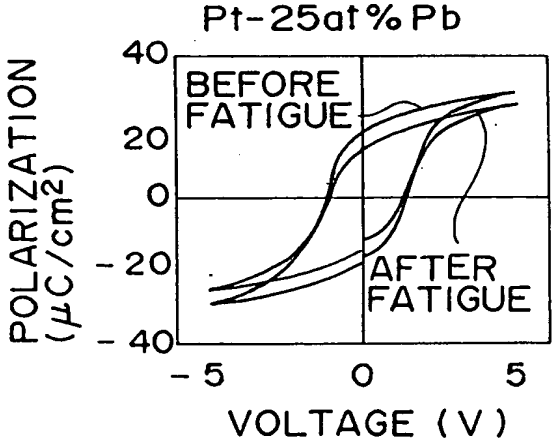

FIG. 8(1)

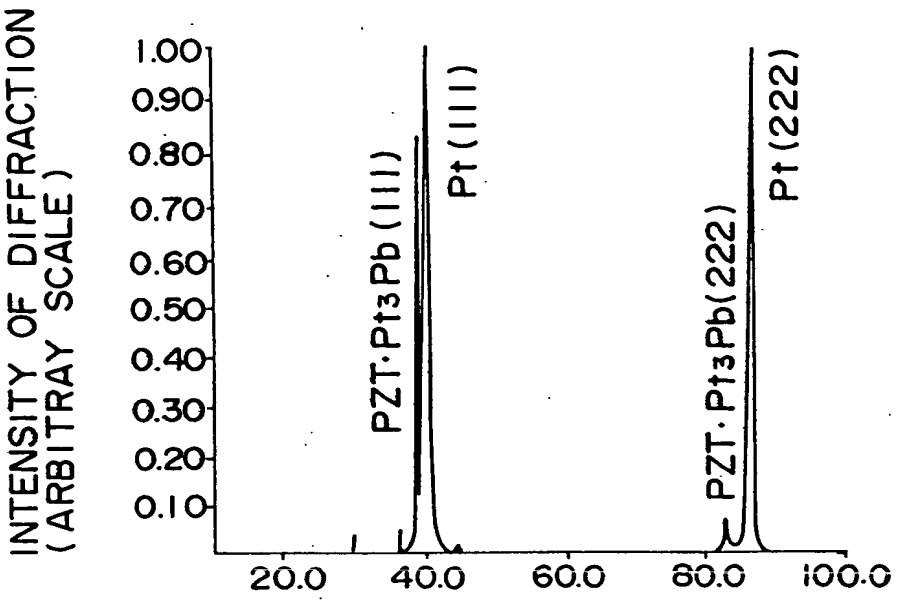
INTENSITY OF DIFFRACTION
(ARBITRAY SCALE)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
PZT·Pt3Pb (111)
Pt (111)
PZT·Pt3Pb(222)
Pt (222)
20.0
40.0
60.0
80.0
100.0

FIG. 8(2)

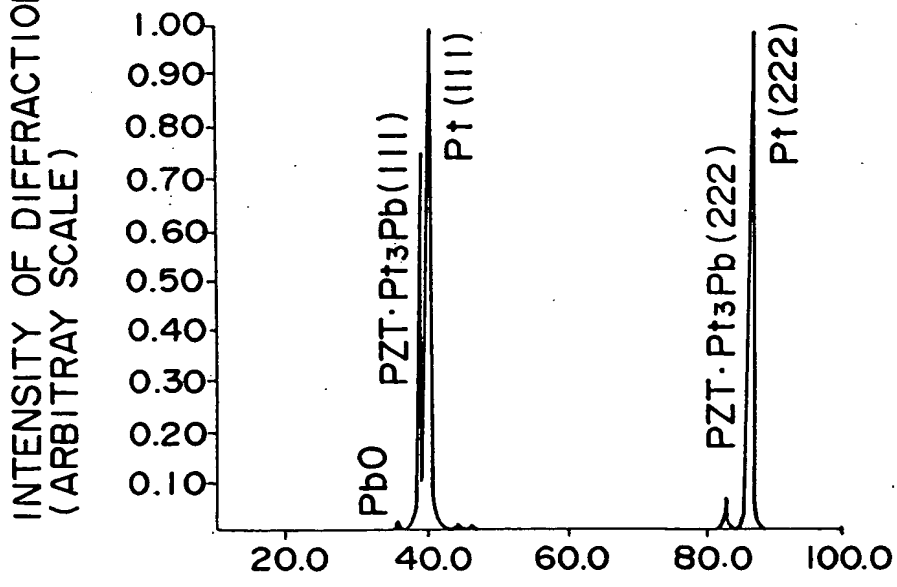
INTENSITY OF DIFFRACTION
(ARBITRAY SCALE)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
PbO
PZT·Pt3Pb(111)
Pt (111)
PZT·Pt3Pb (222)
Pt (222)
20.0
40.0
60.0
80.0
100.0

FIG. 9

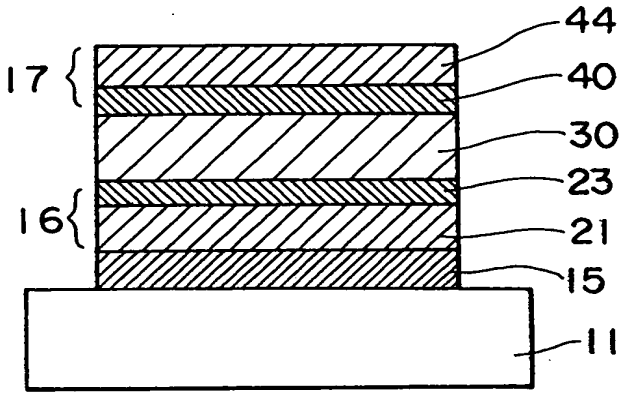
44
17
40
30
23
16
21
15
11

FIG. 10

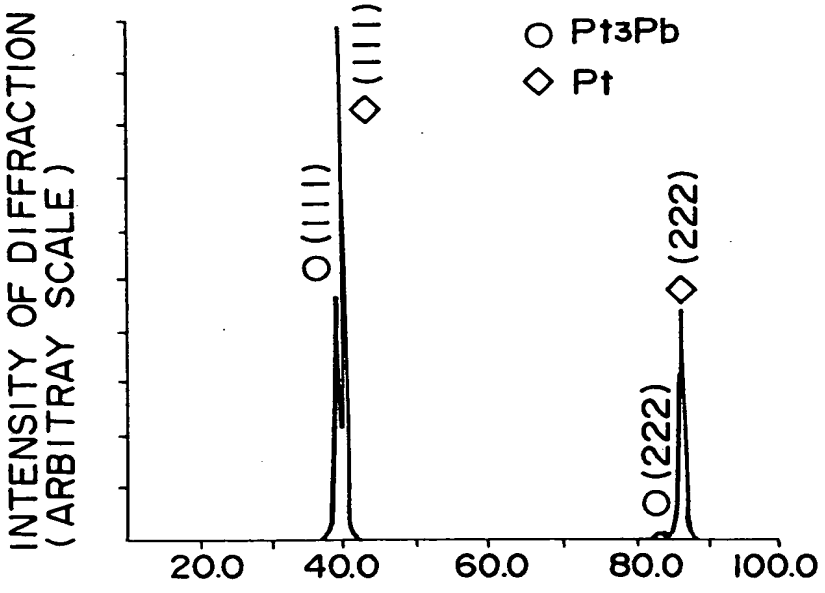
INTENSITY OF DIFFRACTION
(ARBITRAY SCALE)
○ Pt3Pb
◇ Pt
○(111)
◇(111)
◇(222)
○(222)
20.0
40.0
60.0
80.0
100.0

FIG. 11

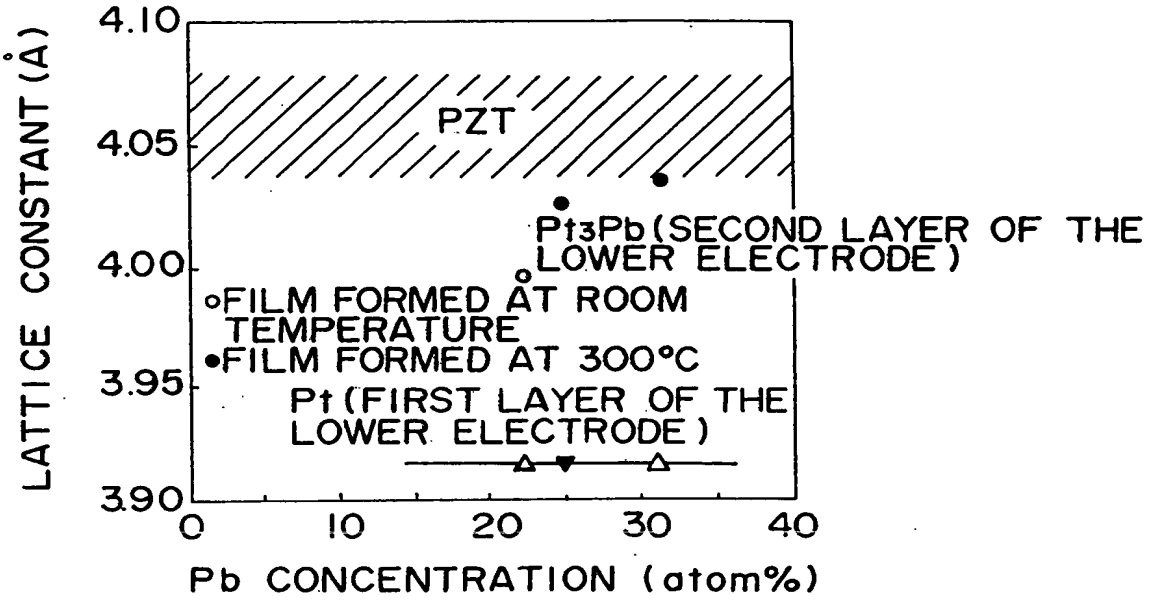
4.10
4.05
4.00
3.95
3.90
LATTICE CONSTANT (Å)
PZT
Pt3Pb (SECOND LAYER OF THE LOWER ELECTRODE)
○FILM FORMED AT ROOM TEMPERATURE
●FILM FORMED AT 300°C
Pt (FIRST LAYER OF THE LOWER ELECTRODE)
0
10
20
30
40
Pb CONCENTRATION (atom%)

FIG. 12

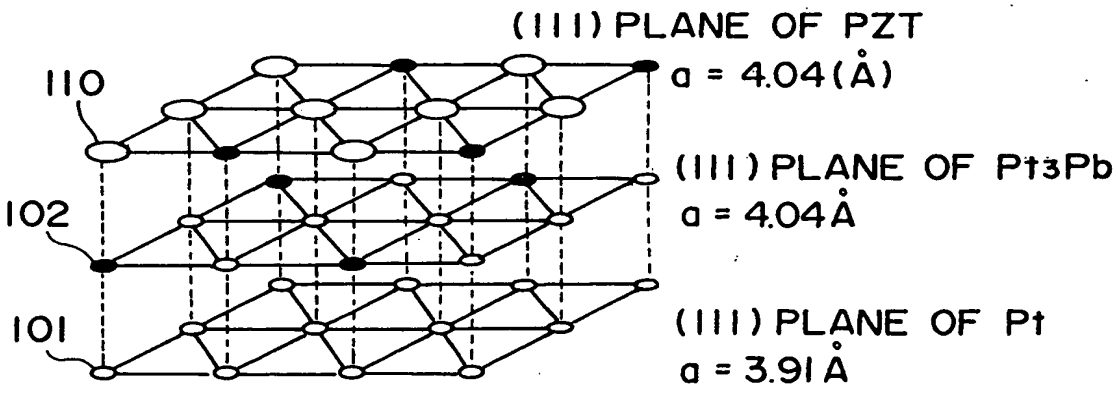
(111) PLANE OF PZT
a = 4.04 (Å)
110
(111) PLANE OF Pt3Pb
a = 4.04 Å
102
101
(111) PLANE OF Pt
a = 3.91 Å

FIG. 13

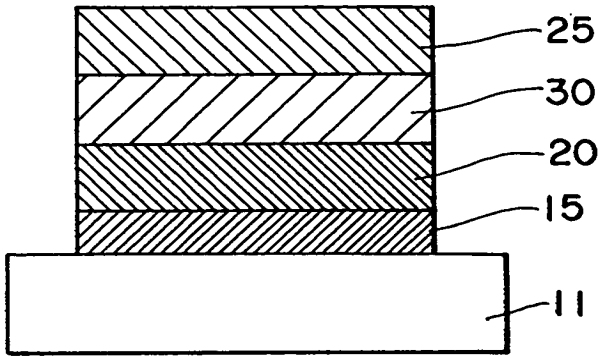

FIG. 14

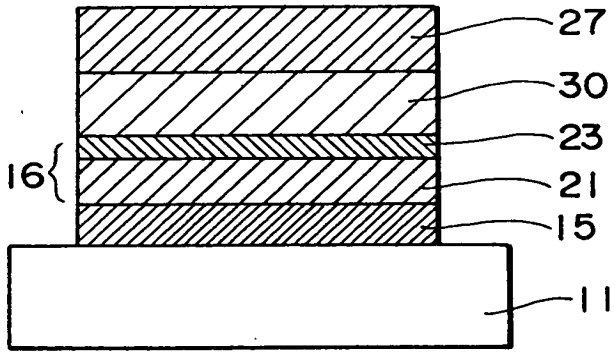

FIG. 15

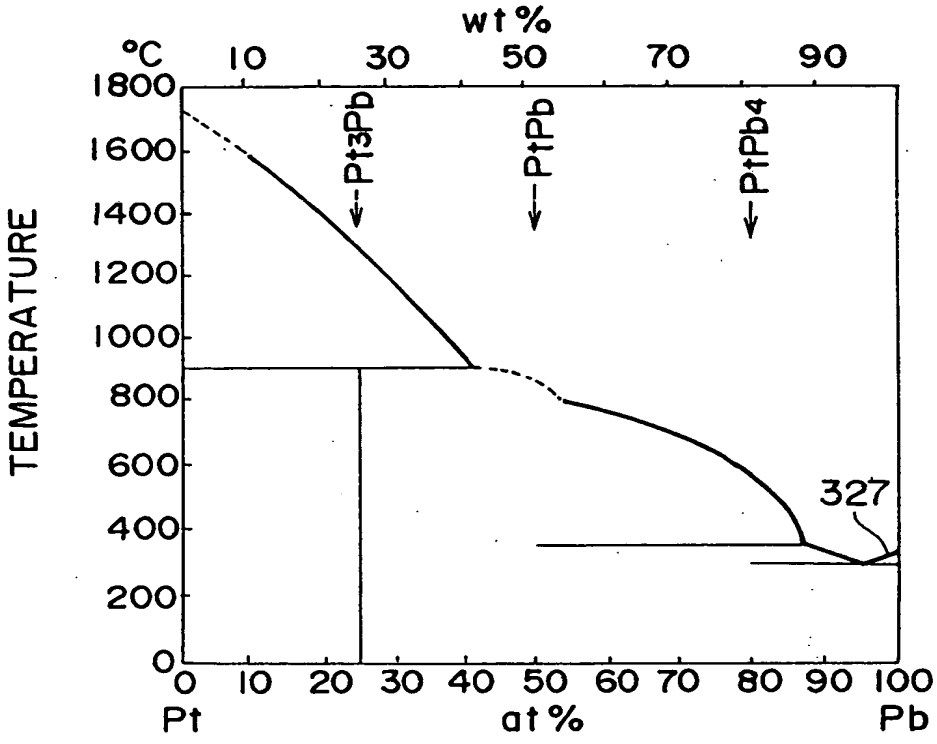
wt%
°C
10
30
50
70
90
1800
1600
1400
1200
1000
800
600
400
200
0
TEMPERATURE
Pt3Pb
PtPb
PtPb4
327
0
10
20
30
40
50
60
70
80
90
100
Pt
at%
Pb

FIG. 16(a)

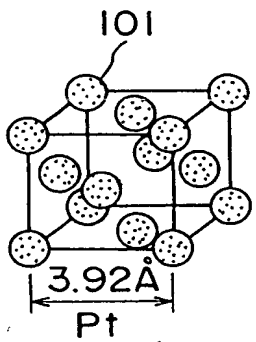

FIG. 16(b)

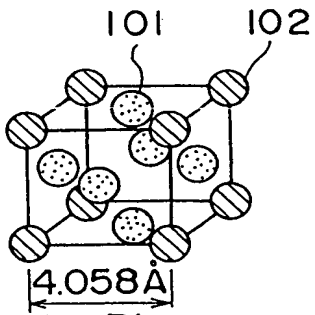

FIG. 16(c)

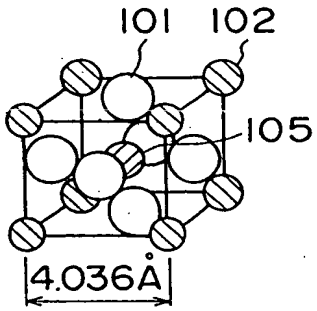

FIG. 17

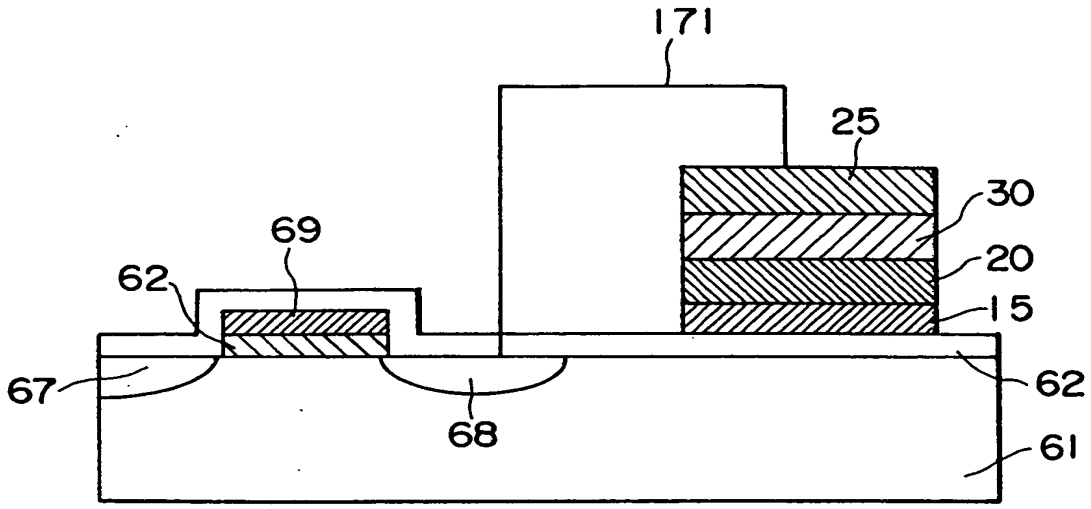

FIG. 18

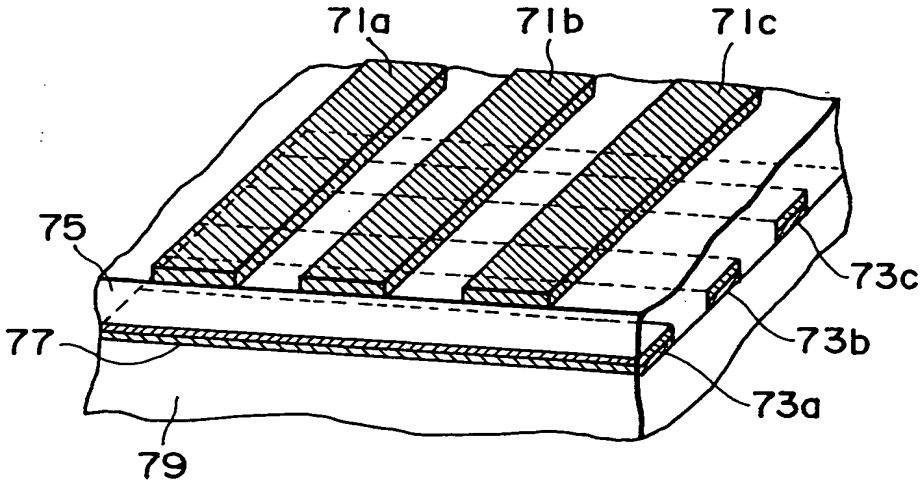

FIG. 19

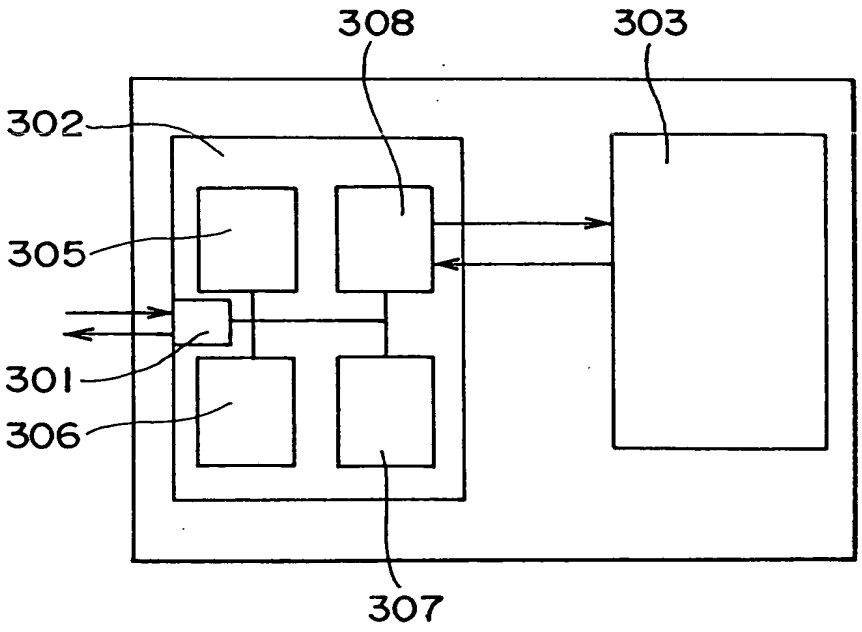
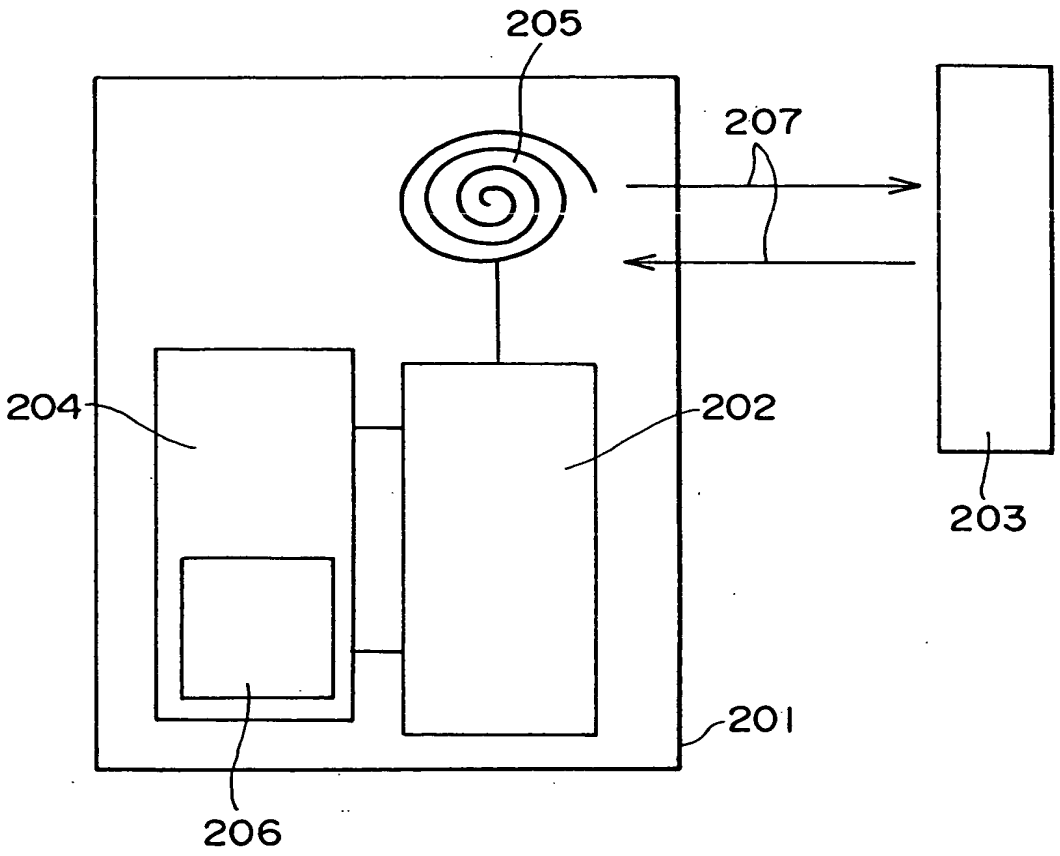
FIG. 20